Probability & Statistics

Statistics 310 • Spring 2014

Instructor:
Genevera Allen (gallen@rice.edu) • DH 2098 • Office Hour: Thursday 4 - 5pm.
Teaching Assistants:
Ryan Warnick, Yulia Baker & Yue Hu.
Please note that ALL course related concerns should be entered through the course website and NOT by emailing the Instructor or TAs.

Time & Location:
Time: Tuesdays & Thursdays 1:00 - 2:15pm. • Location: Herring Hall 100.

Course Description: This course is a calculus-based introduction to mathematical statistics. We will cover basic probability, random variables (continuous and discrete), multivariate distributions, the central limit theorem, and statistical inference, including parameter estimation and hypothesis testing.

Course Objectives & Outcomes: Students will learn the basic laws of probability and random variables as well as how probability connects to data through statistics and statistical inference. Students completing this course should be able to: (i) use the basic laws of probability and random variables, (ii) understand and be able to correctly interpret statistical inference paradigms including hypothesis tests, confidence intervals, and p-values, and (iii) determine and apply the appropriate probabilistic or statistical concepts in practical applications.

Prerequisites: Calculus. Multi-variable calculus is a plus, but is not required. We will review multi-variable calculus techniques as needed in class. Students should also be familiar with basic algebra and set theory. An outline of mathematical expectations for this course are outlined in the separate "Mathematical Background" document.

Recommended Textbooks:
Probability and Statistical Inference by Robert V. Hogg and Elliot Tanis, 8^{th} edition.
Mathematical Statistics with Applications by Kandethody M. Ramachandran and Chris P. Tsokos.

Course Webpage: `https://piazza.com/rice/spring2014/stat310/home`. This is not a typical course website that lists announcements and assignments. This is also an online interactive forum for students to post and answer questions and host discussions. The website is set up like a Wiki page where students can collaborate on questions and solutions. Other students can rate the quality of a question or answer, and instructors can endorse excellent answers. Students should pose ALL course related questions and correspondence through this course website and NOT via emails to the instructor or TAs. Students are encouraged to check this website frequently for announcements and to participate and peruse the current discussions. A good strategy is to log onto this website at least once a day. Iphone and other device apps are also available. The features of the course webpage and instructions for posting and answering questions will be reviewed at the beginning of the semester.
Thank you, Piazza!

Grading Policy:		**Grading Scale**:
Assignments	650 points (≈57%)	A: 90 - 100
Midterm Exam	200 points (≈17%)	B: 80 - 89
Final Exam	300 points (≈26%)	C: 70 - 79
Total	1150 points	D: 60 - 69

Homeworks: There will be eleven weekly homework assignments throughout the semester worth 50 points each. See the separate schedule document for assignment and due dates. Homeworks are due on Thursday at 1pm either in class or in the "Stat 310" box in DH 1092. Late homeworks will NOT be accepted. (So, don't

ask!) Missed homeworks or low homework grades can be supplemented via the optional additional assignments; see the separate "Assignments" document for further details. Homeworks can be done cooperatively, but each student must provide their own write-up that reflects their individual thinking.

Optional Supplemental Assignments & Problems:

- *Statistics in Practice Essays* (20 points each; up to 3): These are 400-600 word essays reviewing and reflecting upon current news articles related to probability and statistics.
- *Challenge Problems* (20 points each; 5 assigned): Challenge problems will consist of a difficult word problem that will be taken as an independent, pledged take-home quiz to be completed in one hour's time.
- *In-Class Netflix Project* (20 points): On March 11th, the entire class will participate in an in-class interactive project using concepts from joint distributions to mine the Netflix movie rating data.
- *March Madness (Probability) Bracket Challenge* (40 points): Coinciding with the NCAA Men's Basketball Tournament, students will have the option of developing a probabilistic model to fill in their brackets and compete with other students to win.
- *OpenStax Tutor* (5 points per week): OpenStax Tutor is an online, interactive delivery system for additional practice problems. Students should create an account at `http://www.openstaxtutor.org` and join Rice's Stat 310 course to view and complete assigned practice problems.

All supplemental assignments and problems are due at 1pm on Thursdays along with the homeworks. See the separate "Assignments" document for further guidelines and grading policies.

Class Attendance, Participation & Clickers: Attendance at lectures is encouraged, but not required. Outlines of each lecture and key concepts will be made available via the course website after each lecture. Students are encouraged to actively participate in lectures by asking questions, correcting the instructor, and answering questions posed. To facilitate participation, we will be using (free) clickers available on computers from `m.socrative.com` or via `Socrative` apps for IPhones and other devices. Bonus points (up to 3 points per week) are awarded for active class participation in-person and/or via clickers. Students are also encouraged to actively participate in the forums hosted on Piazza. Bonus points (up to 2 points per week) are awarded for students who ask, answer, or host discussions (even if done so anonymously) on Piazza.

Exams: There will be one take-home midterm exam and one comprehensive final. All exams will be open book, open notes, and open Wolfram alpha (not open Internet!). The take-home midterm will be a three hour exam that is pledged via the honor code and must be done independently. The comprehensive final is pledged via the honor code and will take place during the assigned final exam period for the course.

Help Sessions: Two help sessions will be held on Tuesdays and Wednesdays from 5 - 6pm in Duncan Hall 1070. These sessions will review concepts by going through examples from OpenStax Tutor and provide support for homework problems.

Schedule Overview:

Probability	Weeks 1 - 3
Random Variables: Discrete & Continuous	Weeks 3 - 6
Transformations & Joint Distributions	Weeks 6 - 8
Statistics & Sampling Distributions	Weeks 9 - 10
Estimation & Confidence Intervals	Weeks 11 - 12
Inference	Weeks 12 - 14

A more detailed tentative schedule can be found in the separate schedule document.

Students with a documented disability requiring accommodations should speak with the instructor during the first two weeks of class.

This syllabus is subject to change with reasonable advance notice by the instructor.